XV.—*Descriptions of four new Asiatic species of the genus* Pupa *of Draparnaud.* By W. H. Benson, Esq.

In the 'Zeitschrift für Malakologie' for 1846 Dr. Pfeiffer adverts to the paucity of known species of *Pupa* from other countries than Europe, North America, the West Indies, and the Cape of Good Hope. In his 'Monographia' he cites only *Pupa bicolor*, Hutton, as inhabiting India as well as the Isle of Bourbon (*P. Largillierti*, Philippi), giving but a single Indian locality (Mirzapore) for it; and he quotes *Pupa sulcata*, Müller, as a Ceylonese shell. The latter species may possibly occur in the station assigned to it, but it is also certainly a Mauritian shell, haunting the woods around Curepipe, with *P. Pagoda*, Fer., according to Sir David Barclay and Mr. Rawson. *Pupa bicolor* has a very extensive range. Its beautiful vermilion and yellow tints, similar to those of several Mauritian *Pupæ*, attracted my attention to the animal in Bundelkhund as early as 1825; and I subsequently took it in numerous localities*, but in no place very plentifully, from the foot of the Himalayas in Rohilkhund down to the neighbourhood of Calcutta. In 1847 I met with it at Point de Galle in Ceylon, and Dr. Cantor found it, though rarely, in Pulo Penang. It did not occur to me at the Mauritius, although inhabiting its neighbour island.

I have now to make known four new Oriental species; one from China scarcely yielding the palm of size to any of the genus, the other three from India proper, all minute. Of these, two inhabit the Himalaya and one Lower Bengal. Some other species from India have been assigned to the genus *Pupa*, which, however, fall more correctly into the cylindrical division of the genus *Bulimus*.

1. *Pupa regia*, nobis.

T. profundissime umbilicata, elongato-conica, subcylindrica, solida, alba, lævigata, nitidiuscula, oblique et remote, obsoleteque plicato-striata; spira superne sensim attenuata, apice obtusiusculo; umbilico pervio; anfractibus undecim subplanulatis, ultimo antice ascendente, validius plicato, ad basin compresso; sutura lineari, irregulariter crenata; apertura oblique truncato-ovata, sublaterali,

* Viz. Bhamoury, Moradabad, and Bareilly, in Rohilkhund; Etawah and Futtehpore in the Do-âb of the Ganges and Jumna; at Humeerpore in Bundelkhund, south of the latter river; at Jounpore and Mirzapore in the Benares Division, north and south of the Ganges; and at Howrah, on the west bank of the Hooghly river, near Calcutta. It shelters itself in the ground under loose stones, bricks, or wood, and comes forth in the rains of July. At Bhamoury I got it by digging at the root of a tree. It was there much dwarfed. The lower ranges of the Himalaya, within which it has never been met with, rise immediately from that spot; and attain, in the course of twelve miles, an elevation of 8000 feet.

ab axe deviante, intus fulvida; plica columellari profunda, duplicata, parietali elongata, remotiuscula; peristomate valde incrassato, reflexo, subtus latiori, marginibus callo junctis, columellari expanso, superne sinuato, extus angulum efformante, dextro medio antrorsum arcuato.

Long. 43 mill., lat. 23; aperturæ long. perist. incl. 18 mill. Lat. 9 millim.

Hab. prope Nanking, China.

Brought by the late Dr. D. King, H.M.S. Cornwallis, and presented by him to Dr. Cantor, to whose kindness I am indebted for the specimen. A wire introduced into the umbilicus will reach within a short distance of the summit.

2. *Pupa Huttoniana*, nobis.

T. rimata, ovato-oblonga, subcylindracea, hyalina, glabra, apice obtuso; anfractibus 5 convexis; apertura ovato-rotundata, quinqueplicata; peristomate expansiusculo, marginibus callo tenui junctis; plica unica irregulari, sinuata, parietali, columellaribus duobus, palatalibus duobus profundis.

Long. $1\frac{1}{2}$ mill., lat. vix 1 mill.

Hab. rarissime ad Simla montibus sub-Himalayanis occidentalibus; Hutton.

This species (unlike most of the smaller Simla species of land shells) has not hitherto been taken in other parts of the Himalayan chain.

3. *Pupa plicidens*, nobis.

T. umbilicata, ovato-conica, subtrochiformi, glabriuscula, obscure striata, cornea; anfractibus quinque convexis, ultimo ventricoso, antice ascendente, ad basin tumido; sutura impressa; apice obtuso; apertura irregulari, subtriangulari, 9-plicata; peristomate continuo, sinuato, expanso, marginibus callo appresso expanso junctis; dextro medio extus impresso, intus tuberculato-incrassato; plicis parietalibus 3, quarum 2 superioribus elongatis, columellari dentiformi, unica, palatalibus 5, quarum 2 sub-basalibus minutis; margine basali extus callo prædito; umbilico angusto.

Long. 2 mill., lat. $1\frac{1}{2}$ mill.

Hab. ad Landour et Mussoorie, montibus Himalayanis.

The shell is very peculiarly formed, and seems to indicate the transition from *Pupa* to *Anastoma*.

The animal has four tentacula, the superior pair bearing the percipient points or eyes, the inferior very short. The foot is hyaline, the tentacula and neck fuscous. The shell is carried horizontally. It is very local, although tolerably abundant where found. It creeps among moss, on damp rocks, generally in places which are seldom or never visited by the sun, in some of the lofty and precipitous glens of the mountains near Landour. It seems to be a capricious species. On a rock on which I found it abun-

dantly one year, I could not obtain a specimen at the same season in the following year.

4. *Pupa brevicostis*, nobis.

T. rimato-perforata, cylindraceo-ovata, cornea, apice obtuso; anfractibus $4\frac{1}{2}$, longitudine celeriter crescentibus; ultimo antice non ascendente, $\frac{1}{3}$ longitudinis testæ æquante, superioribus convexis, superne remote semicostulatis, ultimo et penultimo subplanulatis, dimidioque inferiori cæterorum sericeis, muticis; apertura rotundato-ovata, 5–6-plicata; plica 1 angulari, brevi; secunda parietali profundiore, obliqua; columellari unica; palatalibus 2–3 profundis; peristomate expanso, subreflexo.

Long. $1\frac{1}{2}$ mill., lat. vix 1 mill.

Hab. ad Barrackpore, Bengal.

Taken by Dr. J. F. Bacon on the trunk of a tamarind-tree at the Cantonment of Barrackpore, near Calcutta, during the rainy season of 1848. Out of several individuals forwarded to me, overland, by letter in a quill, two reached me alive, and creeping about when supplied with moisture enabled me to verify their affinities. The lower pair of tentacula is deficient or inconspicuous, as in *Vertigo*; the upper pair carry the eyes at their summits. The shell is often carried at an angle of 45°.

In 1834 Captain Hutton referred a small shell to the genus under the name of *Pupa cænopicta*, which belongs strictly to *Bulimus*, as conjectured by Pfeiffer, 'Monogr.' vol. ii. p. 82. It is figured, no. 492, in that genus by Reeve. It is necessary to remark that in the numerous specimens which I have examined, the callous parietal tooth at the junction of the outer lip has never been wanting. Yet this character was omitted by Captain Hutton, and it is not noted either in Reeve's figure or description. I first took the shell in Bundelkhund in 1826; specimens received in 1835 from Captain Hutton showed how the tubercle had been overlooked by him, the shells being still covered by the dirt, from the presence of which he had named them. Subsequently I found the species abundant under stones and rocks at Delhi, and Dr. Bacon met with it in great profusion at Kurnâl on mud-walls and under tiles. It has never occurred to me or to my correspondents on the left bank of the Jumna nor of the Ganges. Dr. Bacon found a specimen or two at Dinapore on the right bank of the latter river, so that it has an extensive range to the south and west of those streams.

The only locality hitherto given for the sinistral toothed *Pupa Pottebergensis*, Krauss, from Southern Africa, is the Pottenberg Mountain in Zwellendam, where Krauss found it, though rarely, on plants. Sir Edward Belcher pointed the shell out to me as occurring near the Round Battery in Simon's Bay, among *Me-*

sembryanthema; and I found it subsequently at a distant point of False Bay, near "the Strand," and again at Hout Bay. In all these places it was found among plants and bushes growing on sandy dunes near the sea.

July 13, 1849.

XVI.—*On the Chemical Composition of the Fluid in the Ascidia of* Nepenthes. By Dr. A. Voelcker of Frankfort*.

The watery secretions of certain plants belonging to the genera *Nepenthes*, *Cephalotus*, and *Sarracenia*, have long attracted the attention of botanists; but whilst the secreting organs of these plants have been minutely described, the chemical nature of the fluid itself has been but very imperfectly examined. That these liquids have not met with the attention to which their importance entitles them, may be accounted for by the circumstance that few chemists have an opportunity of obtaining the unaltered fluids, and that even those who are fortunate enough to procure them, seldom can command a sufficient quantity to enable them to investigate their nature. With the exception of Dr. Turner's analysis of the fluid in the ascidia of *Nepenthes*, I know of no other analysis of this fluid or of similar secretions. The botanists who have given attention to the subject of the watery secretions of the leaves of plants have found these secretions to consist in most cases of nothing but pure water, and have only occasionally discovered in them some vegetable matter. Treviranus for instance observed a tasteless water in the corolla of *Maranta gibba*, which he however did not further examine; the same gentleman examined the watery secretion of *Amomum Zerumbet*, and caused Dr. Göppert to subject it to chemical analysis, from which it resulted that the fluid between the scales of the spikes consisted of almost pure water, containing a small quantity of vegetable fibre and mucus.

The most remarkable instance of a watery secretion from the leaves of plants is recorded in the 'Annals of Natural History' for 1848, in a paper by Mr. Williamson, who observed that the leaves of *Caladium destillatorium* had the peculiar power of exhaling watery fluid from a point near the apex on the upper side. Each full-grown healthy leaf, according to Mr. Williamson's observation, produced about half a pint of water during the night, which, on being analysed, was found to contain a very minute portion of vegetable matter.

* Read before the Botanical Society of Edinburgh, July 12, 1849.